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ENERGY NOTES

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Montana's Statewide Energy Code for Residential Buildings

Information for Home Builders and Home Buyers

Overview

Montana home buyers appreciate the comfort and warmth of well-designed, energy efficient houses. With the recent enactment of Montana's statewide energy code, home buyers now have the peace of mind of knowing that Montana houses meet cost-effective standards for energy efficiency. As of February 11, 1994, all new houses in Montana must meet at least minimum standards for energy efficiency. The standards provide cost-effective baseline for wall and ceiling insulation, energy efficient windows, and methods for sealing the house to reduce air infiltration.

The statewide energy code also gives house buyers an additional tool to use in making their purchase decision--the "Energy Efficiency Components Label." This label is a low-cost way for the builder to inform the house buyer of the energy efficient features of the house. It also is useful when comparing the energy efficiency components of new houses.

Enforcement of the code in many areas depends on builder self-certification, so builders must become familiar with the specifics of the energy efficiency measures now required by law for new Montana residences. Buyers also need to understand the code to ensure that their builder complies with the regulations.

Not only do home builders and home buyers benefit from this code, but Montana wins too. Energy efficient homes consume less energy than homes not built to these standards. This means less energy has to be produced to heat and cool these homes which helps conserve our fossil fuel resources and protect Montana's environment.

What Buildings Are Covered Under The Statewide Energy Code?

The standards for energy efficient construction apply to any residential building in Montana (with the following exceptions) on which construction was started after February 11, 1994, regardless of fuel type (gas, electricity, or other).

FIGURE 1 - MONTANA MODEL ENERGY CODE

COMPONENT	OPTION 1	OPTION 2	OPTION 3	OPTION 4	OPTION 5	OPTION 6
Flat Ceiling	R-38	R-42 Raised Heel or Energy Truss	R-38	R-38	R-49	R-38 Raised Heel or Energy Truss
Vaulted Ceiling	R-38	R-38	R-38	R-38	R-38	R-38
Above Grade Walls	R-19 16" O C	R-21 24" O C	R-28 24" O C , R-21 Batt Plus R-7 Sheathing	R-26 16" O.C., R-19 Batt Plus R-7 Sheathing	R-24 16" O.C., R-19 Batt Plus R-5 Sheathing	R-21 24" O C
Below Grade Walls	R-10	R-11	R-11	R-11	R-11	R-11
Floors Over Unheated Spaces	R-19	R-19	R-19	R-19	R-19	R-19
Windows	U-.40	U-.50	U-.50	U-.50	U-.50	U-.40
Exterior Doors	R-2	R-5	R-5	R-5	R-5	R-5

NOTES:

1. Window U-value of .40 is generally a wood or vinyl window with a half-inch airspace and a Low-e coating. A U-value of .50 is generally a wood or vinyl window with a half-inch airspace.
2. Insulation values are nominal. No credit is given for the insulating values of airfilms, siding sheetrock, etc.
3. Option 2 is the prescriptive path identified in ARM 8.50.104.

Are There Any Buildings That Aren't Covered Under The Code?

The following buildings are exempt from standards:

- Farm and ranch buildings
- Private garages
- Private storage structures for the owner's own use that are attached to a residential building
- Manufactured homes (these are covered by HUD codes)

The Energy Efficiency Standards

The statewide energy code provides home builders with a variety of methods for meeting the energy code standards. Figure 1 outlines six options home builders can use to meet the code. Additional options can be calculated using Section 5 of the Model Energy Code. The most common "base case" requirements are shown in the table as Option 1 and in the diagram on Figure 2. This "base case" option includes:

R-38 Ceiling insulation
R-19 Wall insulation
R-19 Floor insulation (for floors over unheated spaces)
R-19 Foundation Wall Insulation
R-10 Basement Wall Insulation
U-0.4 Window Insulation
R-2 Exterior Door Insulation

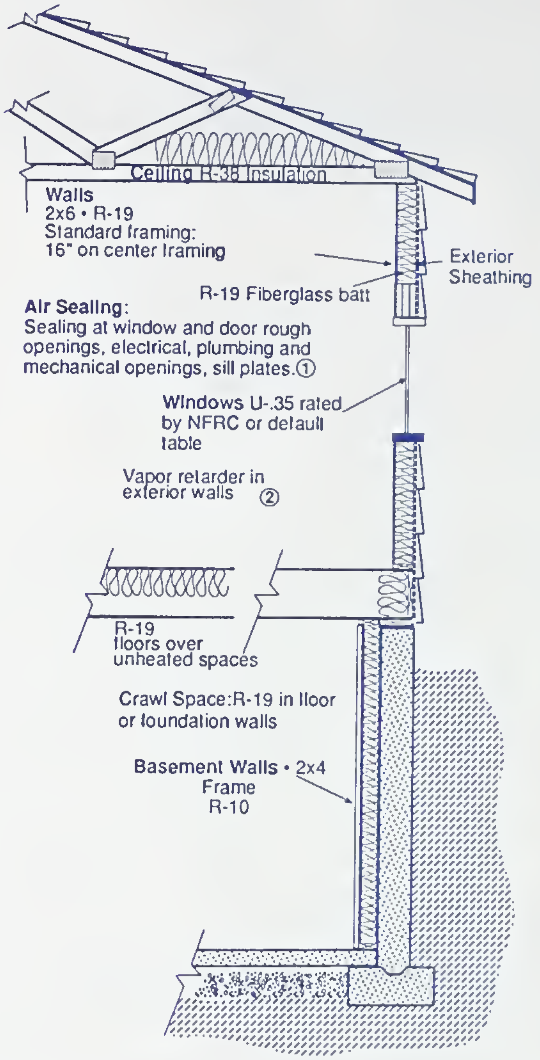
Note: Lesser R-values are allowed for walls in log houses

In addition to the insulation values, new houses in Montana must meet standards for air sealing. According to the code, "Exterior joints in the building envelope that are sources of air leakage, such as around window and door frames; between wall cavities and window or door frames; between walls and foundations, between walls and roof/ceilings and between wall panels; openings at penetrations of utility services through walls, floors and roofs; and all other such openings in the building envelope shall be caulked, gasketed, weatherstripped or otherwise sealed in an approved manner."

Keep in mind that these statewide standards are simply minimum requirements. Depending on the type of fuel used in a house, it may be cost-effective to surpass these standards. For electrically-heated homes in particular, the Department of Natural Resources and Conservation (DNRC) recommends that higher levels of efficiency be considered.

All new houses must meet the energy code and have energy efficient component labels - regardless of location.

FIGURE 2
Option 1. Statewide Energy Code


Ceiling R-38 Insulation
Walls
2x6 • R-19
Standard framing:
16" on center framing
Exterior Sheathing
R-19 Fiberglass batt
Air Sealing:
Sealing at window and door rough openings, electrical, plumbing and mechanical openings, sill plates.①
Windows U-.35 rated by NFRC or default table
Vapor retarder in exterior walls ②
R-19 floors over unheated spaces
Crawl Space:R-19 in floor or foundation walls
Basement Walls • 2x4 Frame R-10

How Is The Statewide Energy Code Enforced?

Local building code departments have enforced an energy code within most cities in Montana for many years, but there was no enforcement outside of these areas. With the statewide adoption of the new code, all builders in Montana are required to follow the code specifics regardless of local enforcement. The cities and counties that provide code enforcement in Montana will enforce the new energy code. Outside these areas, the code will be enforced through the builder self-certification process. For the energy code only, a "builder self-certification" process will apply. This means that the builder is required to provide a written statement to the new owner of a residential building certifying that it meets the minimum standards for energy efficiency. The home builder provides this certification by signing and dating the energy efficient components label described in the following section.

The Energy Efficiency Components Label

A smart home buyer is a comparison shopper. However, finding information on the energy efficiency components of different houses has not always been easy. Fortunately for new home buyers, the statewide energy code requires builders to place accurate information on energy efficient components in all new houses. The information is presented on a simple, easy-to-understand label called the Energy Efficiency Components Label. This label is a low-cost way of informing potential buyers about the insulation levels, heating system efficiencies, and other energy features of a new house. The label also ensures that information about these features is not lost over time. The label is permanently attached to the house's breaker box, so subsequent owners will have the same information available to them.

A sample of the Energy Efficiency Components Label is shown in Figure 3.

FIGURE 3

ENERGY EFFICIENCY COMPONENTS

Address:____________________________

Ceiling: Flat R-______
Vaulted R-______
Walls: Above grade walls R-______
Basement walls R-______
Crawlspace foundation R-______
Floors: Over unheated spaces R-______
Perimeter slab R-______
Under slab R-______
Exterior doors: R-______
Windows: NFRC unit rating (or) U-______
Default window rating U-______
Water heater: Energy factor (EF) rating ______
Heating system: Energy efficiency rating ______
(AFUE for gas; HSPF heat pump)
Other (i.e., ventilation systems, radon abatement___
____

Insulation Subcontractor:____________________

Certified by:________________Date: ______
Builder (Company):______________________
The home builder certifies compliance with ARM 8.70.104 by completing and signing this label.
THIS LABEL IS TO BE PERMANENTLY AFFIXED TO THE INTERIOR BREAKER PANEL

Copies of the label are available from many sources. Several utility companies are distributing labels as a public service. Local Montana Homebuilder Association offices in Billings, Bozeman, Great Falls, Helena, Kalispell, and Missoula distribute labels to their members. Labels are also available from the Building Codes Bureau, Department of Commerce, 1218 East Sixth Avenue, P.O. Box 200517, Helena, Montana 59620 - 0517. Camera ready copies are available from the Department of Natural Resources and Conservation for builders who want to print their own labels.

SUMMARY GUIDELINES FOR HOME BUILDERS

- Build all new residential buildings to meet the standards of the statewide energy code. If construction begins on a residential building in Montana after February 11, 1994, the building must meet the minimum energy efficiency standards described in this fact sheet.

- Obtain or print your own Energy Efficient Components Labels.

- After you receive your label, fill in all of the information on the energy components of the new house. Certify the accuracy of the information with your signature and date. Signing this label also indicates that you have certified the home as meeting the minimum energy efficiency standards of the statewide energy code. Finally, attach the label to the breaker box of the new house.

- Keep in mind that these standards are only minimum requirements. Consider building homes using higher insulation levels or other energy efficient techniques, especially if the home is to be electrically heated.

- Spread the word. Let other builders know about the statewide energy code, and encourage their compliance with the requirements.

SUMMARY GUIDELINES FOR HOMEBUYERS

- Use the information on the Energy Efficiency Components Label to "comparison shop" for energy efficient housing. The Energy Efficiency Component Label lets you do an item-by-item comparison of the energy efficient features of the different homes you are considering.

- Compare the energy efficiency information on the new house's Energy Efficiency Components Label to the minimum efficiency standards listed in this fact sheet. Insulation levels should meet or exceed the minimum levels shown in Figure 1.

- Even though these standards are now law, many builders may still be unaware of the change. You can help increase home builder compliance to the standards by insisting that the standards are met in any new house you plan to purchase. If the Energy Efficiency Components Label isn't on the breaker box, insist that the home builder complete one.

- The statewide energy code will help keep new Montana homes affordable and comfortable. But remember that there are many other ways to keep your home warm and cozy and your energy bills low. Tell your builder you are interested in energy efficient lighting and appliances, and stay current on information on energy efficiency available from your local utility, DNRC and other sources.

Deciphering The Energy Efficient Components Label

A good comparison shopper needs to understand certain units of measurement, whether it's MPG (miles per gallon) when shopping for a new car, or the price per pint of fresh Montana huckleberries at a roadside stand in August. Shopping for energy efficiency also involves knowing a few units of measurement. Each Energy Efficiency Components Label may contain five or more different units of measurement. The following definitions will help you crack the code of energy efficiency.

- R-VALUES—The units used to measure the insulating value of an object. The higher the R-value, the more insulating value an object has. A six-inch-thick batt of fiberglass insulation typically has an R-value of 19.

- U-VALUES—Another unit of insulation measurement, U-values measure heat loss through windows. The U-value of a window is the reciprocal of its R-Value (U = 1/R). For instance, a window with a U-value of 0.4 is equivalent to a wall with an R-value of 2.5 (0.4 = 1/2.5). Because the U-value is the inverse of the R-value, a lower U-value indicates a window that has better insulating capabilities than a window with a higher U-value.

- NFRC UNIT RATING—The National Fenestration Rating Council (NFRC) determines the U-value for most windows. This rating is placed on a label attached to all new NFRC rated windows. If the NFRC rating is available, the home builder should use this number when filling in the U-value on the Energy Efficiency Components Label for a new home. Windows with a U-value of 0.4 or less usually have a low-e coating and at least a half inch air space between glazings.

- DEFAULT WINDOW RATING—If the NFRC Unit Rating is not available, then the home builder should use the default U-value ratings from the following table (figure 4).

- EF—Used to determine the energy efficiency of hot water tanks, EF is the abbreviation for "Energy Factor." This unit is a ratio of the heat energy contained in the water in a hot water tank over a certain period of time divided by the energy that the hot water heater consumes over the same time period. The most efficient electric water heaters have an EF rating of 0.93 to 0.96, while the most efficient gas-fired water heaters have energy factors ranging from 0.60 to 0 86.

- AFUE—An abbreviation for "Annual Fuel Utilization Efficiency." AFUE is a measure of the effectiveness of gas and oil space heating systems. It is calculated by dividing the amount of heat energy that goes into your heating system by the amount of heat energy that is delivered throughout your house as usable heat. All furnaces and boilers in the United States are required to have an AFUE rating of at least 78 percent. The most efficient gas furnaces have an AFUE of 92 percent to over 96 percent, while the most efficient gas hot-water boilers have AFUE ratings of around 84 percent to 90 percent. Energy efficient oil furnaces have similar AFUE ratings, in the mid-80s to 90 percent. The most efficient oil-fired hot water boilers have efficiencies that are slightly lower, with AFUE ratings up to around 85 percent. Gas or oil-fired steam boilers have somewhat lower ratings, with the most energy efficient units having an AFUE around 80 percent.

- HSPF—Heating Season Performance Factor is the measurement unit for determining the efficiency of heat pumps. It is calculated by dividing the estimated seasonal heating output (in Btu) by the seasonal power consumption (in watts). The most efficient electric heat pumps on the market have an HSPF of between 7.7 and 10.

FIGURE 4 - DEFAULT WINDOW U-FACTORS

WINDOW GLAZING TYPE	WINDOW FRAME TYPE	
	Wood / Vinyl	Aluminum with Thermal Break
Double Glazing		
1/4 in. air space	.56	.67
1/2 in. air space	.51	.62
Double Glazing (Hard Coat Low-e)		
1/4 in. air space	.49	.59
1/2 in. air space	.42	.52
1/4 in. argon gas	.44	.54
1/2 in. argon gas	.39	.48
Double Glazing (Soft Coat Low-e)		
1/4 in. air space	.47	.57
1/2 in. air space	.40	.49
1/4 in. argon gas	.42	.52

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